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Note on the Utilization of Bamboo for the Manufacture of Paper-pulp.

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INTRODUCTION.

THE idea of manufacturing paper-pulp, from the raw material available from the forests of India, dates back nearly fifty years, though the only one of the many fibre-yielding plants available and now in common use for this purpose is Sabai grass (*Ischæmum angustifolium*). The possibility of manufacturing pulp from other Indian species is fully recognised, but, so far, the commercial world has considered the data available on this subject insufficient to justify starting work with those fibres. When the enquiry of which this report is the outcome was commenced in 1908, the idea was to investigate the possibility of manufacturing pulp from both timber and bamboos. As the work of getting together the necessary information proceeded, it was found that the collection of reliable data on both subjects at one and the same time was not practicable, as by so doing the enquiry would become too lengthy and complicated. It was, therefore, decided to take up bamboos as a commencement and to leave the woods until fair progress had been made with the enquiry concerning the former species. This report, therefore, deals with bamboos only.

A further restriction was also placed on the bamboo enquiry. It was thought advisable to restrict the area over which examination of the

forests should be made and to visit only a few of the most suitable localities for the purpose of collecting the necessary information. It must, therefore, be clearly understood that, though the forests, which are described in this report and which are shown on the maps, are favourable localities, from which bamboos can be extracted at cheap rates and are geographically well situated for that purpose, they are by no means the only places in British India in which it would be possible to work a pulp-mill at a profit.

Some explanation is necessary as to the limited scope of this enquiry, as regards locality. Up to date no firm or company has taken up the manufacture of pulp from bamboos in this country, and the object of this enquiry is to try and induce a firm to do so, as it is thought that if a commencement is once made and if the experiment proves, or clearly promises to be commercially successful, an industry of considerable importance may well be established. With this object in view, a limited number of localities have been chosen, which are considered suitable for the purpose, and about which definite information is given in this report.

The places selected for examination were Lower Burma and the West Coast of the Indian Peninsula, as both localities are geographically well situated for import and export purposes and also contain vast areas covered with bamboos. In Burma five localities were visited of which a careful inspection was made, namely, the Rangoon, Tharrawaddy, Pyinmana, Toungoo and Arakan Divisions. In Bombay three were inspected, namely, one partly in the North and partly in the West Kanara Forests Divisions, a second entirely in the Western Division and a third in the East Kanara Forest Division. In Madras a similar number were selected, namely, one in the South Canara Division, and one in each of the North and South Malabar Forest Divisions. The report, therefore, deals with five possible areas, from which bamboos could be exploited for the purpose of manufacturing pulp in Burma, and six on the West Coast of India.

In 1905 the Government of Burma invited Mr. R. W. Sindall, F.C.S. (London), a paper-pulp expert, to visit that country with a view to enquiring into the possibility of manufacturing paper-pulp. His report on the subject appeared in March 1906, and is one of great value. In it he laid down the lines along which further enquiry should be made, and it is largely on his proposals that the present enquiry has been based.

The writer of this report, with a view to collecting further information as to the lines on which the enquiry should be carried out, visited three of the largest paper-mills in India, and by the courtesy of the Managers of those mills, was able to ascertain what further data would be required by pulp manufacturers before they would consider the possibility of starting a mill in which bamboo would be used as the raw material. Their chief difficulty was the want of definite information as regards localities from which a large sustained yield of bamboos could be obtained at cheap rates and the possibility of manufacturing a fixed grade of pulp within a workable figure of cost. Messrs. Sindall and Raitt have proved, by their laboratory tests, that fair pulp could be made from bamboos, but the information as to supply, cost and grade of pulp when worked on commercial lines still remained to be collected.

To overcome these difficulties, the areas above mentioned were carefully inspected and extensive countings and weighings of bamboos carried out to obtain figures of yield, while to obtain a practical proof of the quality and cost of preparing pulp from bamboos, about 80 tons of raw material, of four different species of bamboos, were sent to the Titaghur Paper Mills and through the good services of the Managing Agents, Messrs. F. W. Heilgers of Calcutta, the whole was converted into pulp and eventually into paper.

The writer of this report also wishes to acknowledge the help which has been given him by various officers of the Forest Department, firms and private persons, without whose assistance it would have been quite impossible to carry out the enquiry.

While touring in various Provinces of India and in Burma he received the greatest help and kindness from all Forest Officers; it is impossible for want of space to mention more than a few of these officers by name. Amongst those who rendered the greatest assistance were Messrs. M. Hill, C. G. Rogers, F. A. Leete, G. E. S. Cubitt, J. J. Rorie, H. L. P. Walsh, H. C. Walker, C. H. Philipp, J. V. Young, G. H. Alington and E. M. Buchanan in Burma; Messrs. T. R. D. Bell, L. S. Osmaston, W. E. Copleston, A. G. Edie, W. A. H. Miller and G. S. Butterworth in Bombay; and Messrs. F. A. Lodge, G. F. F. Faulkes, D. T. Barry and A. Wimbush in Madras.

Mr. Coventry, formerly Imperial Forest Chemist, carried out laboratory tests with bamboos at the Forest Research Institute, Dehra Dun, and further laboratory tests, the results of which are given

in his separate report on this subject, have since been carried out by Mr. W. Raitt, a pulp expert, to whom the writer is indebted for much help and advice.

Through the courtesy of Messrs. F. W. Heilgers, Managing Agents to the Titaghur Mills, it has been possible to have tests carried out with bamboos on a commercial scale, and it is largely due to the interest taken by them, especially by Messrs. Bryce, the General Manager of the Titaghur Paper Mills, and J. Thomson of that firm and to their report on the tests carried out by them that it has been possible to complete this enquiry. Acknowledgments are also due to Messrs. Balmer, Lawrie & Co., of the Bengal Paper Mills, for allowing the writer to visit their mills at Raneegunge and for affording him valuable information as to the present position of the pulp industry in India.

Lastly, the writer has to acknowledge, with thanks, many reports from various Forest Officers all over India, many of which contained valuable information as to possible outturn of timber and bamboos from their divisions, and though much of it does not find a place in this report, it is ledgered in the office of the Forest Economist at Dehra Dun and it will, without doubt, be of the greatest value later on, should the pulp industry develop in India.